bacteria were found, five of which (*B. mycoides, liquefaciens, luteus, sarcina lutea*, and *aurantiaca*) are already known. As the ordinary dwelling-place of the *Bacillus mycoides* is the earth, we are confronted with the fact that microbes of terrestrial origin may be carried up into the air, and thus rain, snow, and hail may be the direct means of conveying infection.

Mechanism of Respiration in the New-Born.

Dohen, from a study of this subject at the clinic of Königsberg, reaches the following conclusions, as we learn from *The Brooklyn Medical Journal:* 1. The respiration of the new-born is thoracic. 2. The elevation of the thorax begins at the summit, and descends progressively. 3. The tidal air averages 35 cubic centimetres, and reaches a maximum of 120. 4. The exchange of air is feeble in the first days after birth; at the end of the first week is a third larger than the first day. 5. Generally at the first inspiration the lungs are not filled with air, the alveoli unfolding only on the second day (a fact of medico-legal importance). 6. The respiratory curves of the new-born present no stationary points.

The Art of Medicine *vs.* the Science.

What Emerson said of the poet is applicable in its degree to the true physician: "As the eyes of Lynceus were said to see through the earth, so the poet turns the world to glass, and shows us all things in their right series and procession: for through that better perception he stands one step nearer to things, and sees the flowing or metamorphosis. . . . The poet alone knows astronomy, chemistry, vegetation, and animation; for he does not stop at these facts, but employs them as signs." It is not enough for the physician to know anatomy, physiology, chemistry, and pharmacology: he must not stop at knowing these, but must put them into the alembic of his brain, and transmute them into medical science. It is stated in the *British Medical Journal* that Professor Huxley said that it would be simply manslaughter for a doctor to treat his patients on the raw and undigested principles of physiology. Medicine must therefore never be looked upon as a mere science, because it is much more than that, it is wisdom sublimated from many sciences; and this is why the Gulls, the Jenners, and the Clarks can never be as common as the mere scientists who work by rule and scale. When Coleridge was accused of plagiarizing, in his "Hymn to Chamouni," from the poem of Frederica Brun on the same subject, it was easily explained, that, though he had taken her framework and used certain of her ideas, he had done so simply to glorify and endow them with life. With her they were dead phrases: Coleridge created the "Hymn to Chamouni" out of them. Just in proportion as the physician can create diagnosis and treatment for the cases which come before him as living and as various as the patients which are the subjects of the different diseases, just by so much is he a true physician. The inferior mind may see the same things as the superior, but the latter alone "sees their flowing and metamorphosis." This is why patients would go and talk to Sir William Gull, and derive benefit from the conversation, though they came away with no prescription, and took no drugs from his hands. The vulgar mind cannot understand the reason of this, and the hard scientist smiles a little superiorly at the idea.

Heredity of Tuberculosis in Comparison with its Propagation.

Attention is called, in the *Lancet* of June 14, to a pamphlet on the above subject by Dr. A. Haupt, in which it is stated that among the 1,500 inhabitants of Soden there are 101 who let lodgings. In most of the houses the wives, with sisters or daughters, serve and tend the tuberculous patients who come for treatment. In many houses servant-girls from the neighboring villages, hired for the summer, help, making the patients' beds, cleaning their rooms, beating the carpets, removing the sputum. These occupations, so closely connected with the danger of infection, are, among others, the tasks of these persons; and it must be added that they prefer the severest cases, because, as more help is required, the remuneration is higher. In winter the members of the landlords' families occupy the rooms in which generally the most severely affected patients have lain, — the rooms on the ground floor. Between 1855 and 1888, 48 of the 233 members of such families died, 10 of them of tuberculosis. In 6 of these 10 cases, heredity was demonstrable, and the remaining 4 were due to colds and external causes. Of the 415 servant-girls, 17 died, 5 of them of tuberculosis, also demonstrably due to other causes than infection. Within 30 years, then, among 653 persons, most of whom were for several summers with and in attendance on the patients, there were 15 deaths from tuberculosis, none caused by infection. The same proportion prevails among other persons in close contact with consumptive patients, attendants, washerwomen, etc. As to the general mortality of Soden, the following data are interesting: 76 persons died during the last three years, 10 aged from 80 to 85, 11 from 70 to 80, 9 from 60 to 70. Of these 76 deaths, 7 were due to tuberculosis, including 2 cases of tuberculosis meningitis in children, and 1 of tuberculosis of the bones, also in a child. Of the 4 other cases, only 1 was that of a person who came in contact with patients, and this was a case of alcoholism, ending in phthisis.

The Transmission of Typhoid-Fever by the Air.

Dr. Bordas, as we learn from a contemporary medical journal, has instituted experiments to determine the relation between the humidity of the atmosphere and the transmission of the typhoid bacillus. A current of dry air completely devoid of germs was conducted through a vessel containing a beef-broth culture of the bacillus, and into a second vessel containing sterilized beef-broth. The second vessel remained sterile. The result was the same when a dry atmospheric current was passed over pumice-stone saturated with a culture of the typhoid bacillus. When moist air was passed through the same vessels, a very different result was obtained. The sterile beef-broth culture was found, after the lapse of a quarter of an hour, to be thickly planted with the bacilli.

In nature this state of humidity is supplied by mist or fog, and statistics show an increase of typhoid-fever in Paris during the months of October, November, December, and January. The most general mode of propagation of typhoid-fever is by the contamination of the soil or water, but there are cases in which it is manifested by pulmonary localization The germ may penetrate into the bronchial system, in spite of every means of defence possessed by the organism. Metchnikoff's studies prove that the lungs are a phagocyte battle-ground. In typhoid infection, due primarily to pulmonary lesion, it would seem that the phagocytes of the lungs are ordinarily sufficient to prevent the development of the infectious germ, and that contagion by means of the air can take place only when the macrophagic cells cease to offer an obstacle to the invasion of the microbe.

LETTERS TO THE EDITOR.

*** *Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

The editor will be glad to publish any queries consonant with the character of the journal.

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

Temperature in Storms, and High Areas.

IT is an axiom, that, in making any special investigation as to the relation of cause and effect, we must separate out all influences tending to confuse and mask the special cause or force which we are studying. We may form an abstract conception beforehand of what effect we may expect to follow a certain cause, but we shall be seriously misled if we allow this hypothesis to take the place of a careful analysis step by step in our investigation. For example: suppose we reason, regarding the deposition of dew, that a fleece of wool suspended horizontally six feet above grass ground will collect more dew than one on the ground, because the warm ground will give up its heat rapidly, and prevent the lower fleece from cooling as much as the other. If we try the experiment, we shall find our reasoning entirely disproved by the facts. We have ignored the fact that the air near the upper fleece is in constant motion, and also that the heat of the earth cannot communicate itself to the tips of the wool fibres. Again: if we wish to find the pressure of the air at Mount Washington, for example, we may reason that since the pressure at

Portland, Me., which indicates the total pressure to the top of the atmosphere, is 29.93 inches in January, and 29.81 inches in July, therefore the pressure at Mount Washington must be .12 of an inch lower in July than in January. This would be vicious reasoning, however, because we have ignored the fact that it is warmer in July than in January, and consequently there is more air above the mountain in the former month. If we put the question to nature, we shall find that the pressure, instead of being less in July, is actually half an inch more on the mountain.

We might at once conclude that there is a reversal of the usual conditions, and that instead of having high pressure with low temperature, and *vice versa*, as we are accustomed to note at the earth's surface, we have on the mountain high pressure with high temperature, and *vice versa*, and extend our theory to storms and high areas. It seems to me this would again be very vicious reasoning: in fact, since there is a reversal of the law of pressures between sea-level and at some height, it would be impossible to connect directly the fluctuations of temperature and pressure at the two situations. May we not consider that when a storm approaches a station at sea-level it brings with it a high temperature, owing to the south winds that blow toward it, and that this high temperature must extend to a great elevation in the atmosphere? In other words, why may we not study temperature conditions without considering the pressure at all? We find that in a storm the temperature may rise twenty to thirty degrees at the earth. Let us take out all the cases in which there is a marked rise and fall in temperature at sea-level, say ten degrees in two days, and determine the conditions at the height of Mount Washington for the same days. In the following table I have taken out the temperature at the maximum and minimum points at Burlington, Vt., during the months October, November, and December, 1873, and January, February, and March, 1874, and also the temperature for the three days before and after these points. The corresponding temperature for exactly the same dates at Mount Washington (6,279 feet) were taken out. There were found twenty cases at the maximum point, and the same number at the minimum. The mean of each ten of these cases is given in the table.

	MAXIMUM POINT.				MINIMUM POINT.			
	1st 10 cases.		2d 10 cases.		1st 10 cases.		2d 10 cases.	
	B.	W.	B.	W.	B.	W.	B.	W.
3 days before	32	20	29	18	48	34	41	24
2 " "	32	21	32	19	50	32	40	23
1 day "	44	34	42	25	42	26	35	18
At the.......	51	37	48	29	28	17	22	10
1 day after...	42	26	42	24	43	29	33	18
2 days after..	31	18	29	20	44	33	40	22
3 " "	35	20	36	22	49	32	39	24

These results agree for each ten days, and show, that, when there is a rise of about nineteen degrees before a storm at sea-level, there is a corresponding rise of about fourteen degrees at Mount Washington; and a fall after the storm at the earth of about fourteen degrees corresponds to a fall of about twelve degrees on the mountain. The same results in an opposite direction are still more prominent on the approach and advance of a high area. These results are strictly in accord with the teachings of the most prominent meteorologists, and it seems probable that these teachings must stand against all adverse criticisms. It is very remarkable that so self-evident a truth as that a storm brings with it an increased temperature to a very great height has been sharply assailed in certain quarters. The facts are certainly strongly against these new views, and we must conclude that they could not be sustained for a moment except by ignoring the axiom laid down at the beginning of this discussion. H. A. HAZEN.

Washington, D.C., July 28.

A Scintillating Meteor.

ON Saturday, July 19, at 8.52 P.M., I saw a meteor in the eastern sky, passing through an arc of about thirty degrees in a nearly horizontal direction, at a height of twenty-one degrees above the horizon. Its course was from the south to the north; and I estimate the time during which it was visible as three seconds, rather less than more. The point where its path ended was almost due east. The light it produced was as bright as that of a common arc-lamp at a distance of some two hundred or three hundred feet. There was no sound or other marked indication of a final explosion, but there was a succession of sparks or scintillations during the latter half of its path. A luminous streak, as usual, marked the path for some little time after. J. A. UDDEN.

Augustana College, Rock Island, Ill., July 21.

BOOK-REVIEWS.

Elementary Physics. By MARK R. WRIGHT. London and New York, Longmans, Green, & Co. 12°. 80 cents.

THE author of this text-book is head master of the Higher Grade School, Gateshead, England. The book is suited for use in our high schools and academies, and should be examined by those looking for such a work. The plan is, by experiments which can be performed with apparatus readily constructed, to make the student familiar with the facts of physical science, little attention being given to the theories. This plan will doubtless lead to good results; but it is singular to note how much the theoretical considerations assist in co-ordinating the facts in physical science. It even appears that in the past, on account of defects in theory, most careful and acute observers have sometimes been obtuse in recognizing what the facts really were. The book covers heat, sound, light, magnetism, and electricity, and is to be commended to American teachers.

Heat as a Form of Energy. By ROBERT H. THURSTON, Boston and New York, Houghton, Mifflin, & Co. 12°. $1.25.

ONE of the influences which for the past hundred years has been helping along civilization has been that exerted by the employment of heat to do some of the world's rough work. As long as man used only wind-power or water-power to do his sawing or grinding for him, the question of energy—of capacity for doing work—could hardly be a very complicated one. That the motion of the wind-mill must be taken from the motion of the wind might be suspected, and so with the motion of the water-wheel; but when Watt and others had hitched a fire so as to turn a wheel, it began to dawn on philosophers that there was something in this phenomenon that called for explanation. It was soon found by Rumford and his followers that the capacity of heat for doing work was limited; i.e., that there is a mechanical equivalent of heat. But it was reserved for the students of the latter half of this century to show what are the essentials for the conversion of heat into work, and wherein it was possible to improve the steam-engine so as to prevent, as far as may be, the losses which have taken place in the past.

All this history of the development of the theory of the conversion of heat into work is traced in Thurston's book now before us.

Our author goes further, and tells us in plain language the nature of that newer form of heat engine, the gas-engine, which is now attracting so much attention, and shows us what the advantages and disadvantages of this machine are.

What the future may have in store our author does not venture to predict, but he draws attention to the evidence we have of the direct conversion in nature of oxidation processes into electricity, which processes may be imitated by man in due time, with the result of a more economic production of electricity than is now possible. When this shall be, it can readily be understood that electric prime-motors would be a possibility.

Our readers will know that Professor Thurston is the distinguished head of Sibley College of Cornell University, — a college which is in the very front rank of the schools of mechanical engineering, and will deem his clear exposition of the important subject of "Heat as a Form of Energy" as of especial interest in these days when the engines of the ocean greyhounds are so frequently astounding the world with their performances.